No. 8900133

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT TY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ALFALFA

'5364'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 30th *day of* April *in the year of our Lord one thousand nine hundred and* ninety.

Attest:

Kenneth H Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Clayton Yeutter

Secretary of Agriculture

APPROVAL EXPIRES 4-30-85

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION	3. VARIETY NAME
Pioneer Hi-Bred International, Inc.	XAR64	5364

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*	5. PHONE *(Include area code)*
7305 N. W. 62nd Avenue, P. O. Box 287 Johnston, IA 50131	515-270-3340

FOR OFFICIAL USE ONLY

PVPO NUMBER: 8900133

6. GENUS AND SPECIES NAME	7. FAMILY NAME *(Botanical)*
Medicago sativa	Leguminosae

FILING
DATE: Mar. 27, 1989
TIME: 9:30 ☑ A.M. ☐ P.M.

8. KIND NAME	9. DATE OF DETERMINATION
Alfalfa	August, 1986

FEES RECEIVED
AMOUNT FOR FILING: $ 1800.00
DATE: Mar. 27, 1989
AMOUNT FOR CERTIFICATE: $ 200.00
DATE: Apr. 9, 1990

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*

Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION	12. DATE OF INCORPORATION
Iowa	1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

William T. W. Woodward, 7305 N. W. 62nd Avenue, P. O. Box 287, Johnston, IA, 50131
Jerry Chicoine, 700 Capital Square, 400 Locust Street, Des Moines, IA, 50309

PHONE *(Include area code)*:

14 CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* ☐ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?	17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ Yes ☐ No	☒ Foundation ☐ Registered ☒ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ Yes *(If "Yes," give date)*
☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES ?
U. S. A. Spring of 1989
☒ Yes *(If "Yes," give names of countries and dates)*
☐ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT	DATE
PIONEER HI-BRED INTERNATIONAL, INC.	3/23/89
SIGNATURE OF APPLICANT	DATE
BY: William T. W. Woodward	3/23/89

FORM WA-470 (7-84) (Edition of 3-84 is obsolete.)

1

EXHIBIT A

ORIGIN AND BREEDING HISTORY OF THE VARIETY

'5364'

5364 is a fifteen clone synthetic with clones replicated in the greenhouse and handcrossed. Seed was harvested from each clone and bulked in equal quantities to produce Syn 1 prebreeder seed. Syn 2 seed harvested from 200 random plants in "cage isolation" in 1984 and 1985 was bulked and considered breeder seed. One or more of the parental clones were selected on the basis of clonal evaluation for forage and seed yield, bacterial wilt, Verticillium wilt, Phytophthora root rot, spotted alfalfa aphid, and anthracnose. Parental clones trace back through several intermediate experimental lines to Vernal, Saranac, Saranac AR, Dawson, Culver, Iroquois, Flemish, Flemish x Vernal crosses and other germplasms with minor contribution. Clonal selection for forage yield was based on OP progeny row tests harvested over several locations.

During seed multiplication no variates beyond the limits defined under Exhibit C have been found. Multiplication procedures will insure that seed being sold as 5364 will not be shifted in characteristics beyond presently acceptable limits for alfalfa varieties.

It is confirmed that 5364 meets presently acceptable levels for uniformity for alfalfa varieties.

EXHIBIT B

NOVELTY STATEMENT

'5364'

5364 most closely resembles the variety '629'. 5364 differs from 629 in spotted alfalfa aphid resistance, being classified as highly resistant, while 629 has moderate resistance to the insect.

EXHIBIT (Alfalf

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
ALFALFA *(Medicago sativa* sensu Gunn et al.*)*

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Pioneer Hi-Bred International, Inc.	XAR64	5364

ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
7305 N. W. 62nd Avenue, P. O. Box 287
Johnston, IA 50131

FOR OFFICIAL USE ONLY
PVPO NUMBER
8900133

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place numbers in the boxes to designate the expressions which are characteristic of the commerical generations of th application variety. Data for quantitative plant characters should be based on a minimum of 100 plants. Include leading zeros when necessary (e.g., [0][8][9]) for quantitative data. Comparative data should be determined from varieties entered in the same trial. Plant color may be precisely designated by using any recognized color chart, e.g., The Munsell Plant Tissue Color Charts.

1. WINTERHARDINESS:

[6] CLASS:

1 = Very Non-Winterhardy (CUF 101)
2 = Non-Winterhardy (Moapa 69)
3 = Intermediately Non-Winterhardy (Mesilla)
4 = Semi-Winterhardy (Lahontan)
5 = (Du Puits)
6 = Moderately Winterhardy (Saranac)
7 = (Ranger)
8 = Winterhardy (Vernal)
9 = Extremely Winterhardy (Norseman)

TEST LOCATION: Owatonna, MN

2. FALL DORMANCY:

FALL DORMANCY (DETERMINED FROM SPACED PLANTINGS)

TESTING INSTITUTION AND LOCATION	DATE OF LAST CUT	DATE REGROWTH SCORED	REGROWTH SCORE OR AVERAGE HEIGHT				LSD .05
			APPLICATION VARIETY	CHECK VARIETIES*			
				Vernal	Ranger	Saranac	
Pioneer Hi-Bred Int'l, Inc. Owatonna, MN	8/28/85	10/2/85	34.9	26.3	30.2	32.0	1.9
	9/2/86	10/1/86	31.8	24.0	27.4	28.9	1.6
Pioneer Hi-Bred Int'l, Inc. Moses Lake, WA	9/15/86	10/16/86	16.0	11.0	-	19.0	4.7
	9/15/86	10/16/86	23.0	13.0	-	22.0	4.8

* CUF 101, Moapa 69, Mesilla, Lahontan, Du Puits, Saranac, Ranger, Vernal, or Norseman as appropriate.

Specify scoring system used: Owatonna - Average height in cm of space plants; Moses Lake - Average height of plot in cm

[5] Fall Growth Habit (Determined from Fall Dormancy Trials)

1 = Erect (CUF 101)
3 = Semierect (Mesilla)
5 = Intermediate (Saranac)
7 = Semidecumbent (Vernal)
9 = Decumbent (Norseman)

3. RECOVERY AFTER FIRST SPRING CUT (In Southwest, first cut after March 21):

[3]

1 = Very Fast (CUF 101)
3 = Fast (Saranac)
5 = Intermediate (Ranger)
7 = Slow (Vernal)
9 = Very Slow (Norseman)

TEST LOCATION: Owatonna, MN; Johnston, IA; Lancaster, PA; Connell, WA; Arlington, WI

4. AREAS OF ADAPTATION IN U.S. (Where tested and proven adapted):

[1] Primary Area of Adaptation

[6] [2] Other Areas of Adaptation

1 = North Central
2 = East Central
3 = Southeast
4 = Southwest
5 = Moderately Winterhardy Intermountain
6 = Winterhardy Intermountain
7 = Great Plains
8 = Other *(Specify)* Northern part of 7

5. FLOWERING DATE (When 10% of plants possess open flowers at time of first spring cut):

[ ][ ] Days Earlier Than . . . . . [ ]
Same As . . . . . [ ]
[ ][ ] Days Later Than . . . . . [ ]

1 = CUF 101
2 = Mesilla
3 = Saranac
4 = Vernal
5 = Norseman

TEST LOCATION:

4

6. PLANT COLOR (Determined from healthy regrowth 3 weeks after first spring cut, controlling leafhoppers if necessary).

[ ] 1 = Very Dark Green (524) 2 = Dark Green (Vernal) 3 = Light Green (Ranger)

COLOR CHART VALUE (Specify chart used: _____):

APPLICATION VARIETY: _____

VERNAL: _____

TEST LOCATION: _____

7. CROWN TYPE (Determined from spaced plantings):

[2] Noncreeping Types: 1 = Broad (Vernal) 2 = Intermediate (Saranac) 3 = Narrow (CUF 101)

Creeping Types: 4 = Creeping Rooted (Rangelander) 5 = Rhizomatous (Rhizoma)

8. FLOWER COLOR (Determine frequency of plants for each color class as defined by USDA Agricultural Handbook No. 424 (Barnes 1972), allowing all plants in plot to flower):

[98] % Purple and Violet (Subclasses 1.1 to 1.4)

[1] % Variegated Other Than Blue (Subclasses 2.1, 2.2, 2.5 to 2.9)

[T] % Cream (Class 3)

[1] % Blue (Subclasses 2.3 and 2.4)

[T] % Yellow (Subclasses 4.1 to 4.4)

[T] % White (Class 5)

TEST LOCATION: Connell, WA

9. POD SHAPE (Determine frequency of plants with the following pod shapes produced on well cross-pollinated racemes):

[ ] % Tightly Coiled (One or more coils, center more or less closed)

[ ] % Loosely Coiled (One or more coils, center conspicuously open)

[ ] % Sickle (Less than 1 coil)

TEST LOCATION: _____

10. PEST RESISTANCE: Provide in the appropriate column; trial data for application variety, and resistant (R) and susceptible (S) check varieties, synthetic generation tested, average severity index scores (ASI), least significant difference statistics (LSD .05), the institution in charge of test, year, and location of test, and whether test is a field or laboratory evaluation. Describe scoring system, and any test procedure which differs from standard methods proposed by Elgin (1982). Trial data from other test years or locations should be presented whenever available on a separate document as Exhibit D.
Seeds of the check varieties and germplasm lines listed below can be obtained from the USDA Field Crops Laboratory, Bldg. 001, Rm. 335, BARC-West, Beltsville, MD 20705. Although comparisons with check varieties listed below are preferred, comparisons with any appropriate check variety recommended by Elgin (1982) may be presented.

A. DISEASE RESISTANCE: DISEASE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Anthracnose, Race 1 *(Colletotrichum trifolii)*	Application (MR)	2	17.2 12,3	Approx 150		% Resistant Plants 17.7	University of Wisconsin 1987 Madison, WI Laboratory
	Arc (R)		77.2	"			
	Saranac (S)		5.4	"			
	SCORING SYSTEM: % survival of 14 day old seedlings. Data adjusted to Saranac AR at 65% resistant plants by Pioneer Hi-Bred International, Inc.						
Anthracnose, Race 2 *(Collectotrichum trifolii)*	Application						
	Saranac AR (R)						
	Arc (S)						
	SCORING SYSTEM:						
Bacterial Wilt *(Corynebacterium insidiosum)*	Application (R)	2	39.24	Approx 225	2.30	0.50	University of Minnesota 1987 Rosemount, MN Field
	Vernal (R)		42.00	"	2.22		
	Narragansett (S)		5.82	"	3.45		
	SCORING SYSTEM: Plants scored 0 and 1 (on a 0-5 scale where 0=no disease and 5= dead plant) considered resistant. Data adjusted to Vernal at 42% resistant plants by the University of Minnesota						
Common Leafspot *(Pseudopeziza medicaginis)*	Application						
	MSA-CW3AN3 (R)						
	Ranger (S)						
	SCORING SYSTEM:						

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DISEASE	VARIETY	TESTED	RESISTANT PLANTS	PLANTS TESTED	ASI	LSD .05	YEAR, FIELD OR LABORATORY
Downy Mildew *(Peronospora trifoliorum)*	Application						
Isolate, if known:	Saranac (R)						
	Kanza (S)						
	SCORING SYSTEM:						
Fusarium Wilt *(Fusarium oxysporum f. medicaginis)*	Application (R)	2	51.4	Approx 225	2.36	0.65	University of Minnesota 1988 Rosemount, MN Field
	~~Resistor~~ Agate (R)		54.1	"	2.29		
	Narragansett (R)		47.6	"	2.81		
	SCORING SYSTEM: Plants scored 0 and 1 (on a 0-5 scale, where 0=no disease and 5=dead plant) considered resistant.						
Phytophthora Root Rot *(Phytophthora megasperma f. medicaginis)*	Application (MR)	2	27.03	Approx 225	3.35	0.75	University of Minnesota 1987 St. Paul, MN Field
	Agate (R)		43.00	"	2.90		
	Saranac (S)		16.69	"	4.42		
	SCORING SYSTEM: Plants scored 1 and 2 (on a 1-6 scale, where 1=no disease and 6=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by the University of Minnesota.						
Verticillium Wilt *(Verticillium alboatrum)*	Application (MR)	2	22.1	-	3.29	% resistant plants 9.38 ASI 0.42	University of Wisconsin 1987 Madison, WI Laboratory
	Vertus (R)		41.0	-	2.60		
	Saranac AR (S)		8.6	-	3.88		
	SCORING SYSTEM: Plants scored 1 and 2 (on a 1-5 scale, where 1=no disease and 5=dead plant) considered resistant. Data adjusted to Vertus at 41% resistant plants by Pioneer Hi-Bred International, Inc.						
Other *(Specify)*	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						
Other *(Specify)*	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

B. INSECT RESISTANCE: INSECT	VARIETY	SYN. GEN. TESTED	PERCENT DEFOLIATION	DEFOLIATION IN PERCENT OF RESISTANT CHECK	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Alfalfa Weevil *(Hypera postica)*	Application						
	Arc (R)			100			
	Saranac (S)						
	SCORING SYSTEM:						

10. B. INSECT RESISTANCE (Continued):

INSECT	VARIETY	SYN. GEN. TESTED	PERCENT SEEDLING SURVIVAL	NUMBER OF SEEDLINGS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Blue Alfalfa Aphid (*Acyrthosiphon kondoi*)	Application						
	CUF 101 (R)						
	PA-1 (S)						
	SCORING SYSTEM:						
Pea Aphid (*Acyrthosiphon pisum*)	Application (HR)	2	78.0	Approx 300	4.3	% resistant plants 17.9 ASI 0.48	Pioneer Hi-Bred International, Inc. 1987 Johnston, IA Laboratory
	Konza (R)		24.0	"	2.9		
	Ranger (S)		8.6	"	2.3		
	SCORING SYSTEM: Plants scored 5-9 (on a 1-9 scale where 9=no symptoms and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by PHI.						
Spotted Alfalfa Aphid (*Theriaphis maculata*) Biotype, if known:	Application (HR)	2	97.5	Approx 300	3.3	% resistant plants 30.5 ASI 0.53	Pioneer Hi-Bred International, Inc 1987 Fresno, CA Laboratory
	Konza (R) Baker (R)		70.0	"	2.5		
	Ranger (S)		3.9	"	1.2		
	SCORING SYSTEM: Plants scored 5-9 (on a 1-9 scale where 9=no symptoms and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by PHI.						

INSECT	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Potato Leafhopper Yellowing (*Empoasca fabae*)	Application						
	MSA-CW3An3 (R)						
	Ranger (S)						
	SCORING SYSTEM:						
Other (Specify)	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

C. NEMATODE RESISTANCE:

NEMATODE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Northern Root Knot (*Meloidogyne hapla*)	Application						
	Nev. Syn. XX (R)						
	Lahontan (S)						
	SCORING SYSTEM:						

10. C. NEMATODE RESISTANCE (Continued):

NEMATODE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Southern Root Knot *(Meloidogyne incognita)*	Application						
	Moapa 69 (R)						
	Lahontan (S)						
	SCORING SYSTEM:						
Stem Nematode *(Ditylenchus dipsaci)*	Application (R)	2	32.6	Approx 300	2.84	% resistant plants 10.8 ASI 0.58	Pioneer Hi-Bred International, Inc. 1988 Fresno, CA Laboratory
	Lahontan (R)		38.1	"	3.10		
	Ranger (S)		4.3	"	1.37		
	SCORING SYSTEM: Plants scored 7-9 (on a 1-9 scale, where 9=no symptoms and 1=dead plant) considered resistant						
Other *(Specify)*	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

11. INDICATE THE VARIETY THAT MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR EACH OF THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
Winterhardiness	532	Plant Color	–
Recovery After 1st Cut	Saranac	Crown Type	Saranac
Area of Adaptation	532	Combined Disease Resistance	629
Flowering Date	–	Combined Insect Resistance	526

REFERENCES

Barnes, D.K. 1972. A System for Visually Classifying Alfalfa Flower Color. U.S. Dep. Agric. Handb. 424. 18 pp. (Note: Greenish cast of plate 6, A and B is an artifact of printing, actual colors a blend of yellow and white.)

Elgin, J.H., Jr., (ed.). 1982. Standard Tests to Characterize Pest Resistance in Alfalfa Cultivars. U.S. Dep. Agric. Tech. Bull. (In Press).

Gunn, C.R., W.H. Skrdla, and H.C. Spencer. 1978. Classification of Medicago sativa L. using legume characters and flower colors. U.S. Dep. Agric. Tech. Bull. 1574. 84 pp.

Munsell Color Co. 1977. Munsell Plant Tissue Color Charts. Munsell Color Co., Inc. Baltimore.

NOTE: Any additional descriptive information and supporting documentation may be provided as Exhibit D.

8

EXHIBIT D

8900133

'5364'

APPLICATION FOR REVIEW OF ALFALFA VARIETIES FOR CERTIFICATION
National Alfalfa Variety Review Board

(The criteria for evaluation of applications were developed by the Joint Alfalfa Work Conference and the Association of Official Seed Certifying Agencies.)

Applicant's Name:

Pioneer Hi-Bred International, Inc.

Date: November 15, 1988
(Revised January 10, 1989)

Address:

P. O. Box 287, Johnston, IA 50131

Sponsoring Institution (if other than applicant):

Breeder's name (if other than applicant):

Variety Name: 5364 **Experimental Designation:** XAR64, YAR64, 83CR252, JHR873

The breeder or sponsoring institution or organization must describe and DOCUMENT in this application those characteristics of the variety which give it distinctiveness and merit by supplying the information requested below. Information must be supplied for each category excepting those listed as optional. Action will be deferred unless the application is sufficiently documented.

I. A. Estimate the % of the germplasm sources listed below that contribute to the major genetic constitution of this variety.

M.falcata	Ladak	M.varia	Turkistan	Flemish	Chilean
3	6	19	6	53	12

Peruvian	Indian	African	Arabian	Unknown
1				

B. A statement of origin (including variety names, germplasm releases and/or PI numbers, and the number of plants or % contribution from each) and the breeding procedures or methods and selection criteria used in developing the variety. Include the procedure for producing breeder seed, the generation (e.g. Syn 1, Syn 2, etc.) that is considered breeder seed, and the year of breeder seed production.

5364 is a fifteen clone synthetic with clones replicated in the greenhouse and handcrossed. Seed was harvested from each clone and bulked in equal quantities to produce Syn 1 prebreeder seed. Syn 2 seed harvested from 200 random plants in "cage isolation" in 1983 and 1984 was considered breeder seed. One or more of the parental clones were selected on the basis of clonal evaluation for forage and seed yield, bacterial wilt, Verticillium wilt, Phytophthora root rot, spotted alfalfa

aphid, and anthracnose. Parental clones trace back through several intermediate experimental lines to Vernal, Saranac, Saranac AR, Dawson, Culver, Iroquois, Flemish, Flemish x Vernal crosses and other germplasms with minor contribution. Clonal selection for forage yield was based on OP progeny row tests harvested over several locations.

C. **Seed classes to be used, limitations on age of stand and areas of production for each class.**

Seed Class	Synthetic Generation	Length of Stand Allowed	Limitationon Areas for Seed Production
Breeder	2	Two	None
Foundation	3 or 4	Three	None
Certified	3, 4, or 5	Five	None

Only the synthetic generations given for the above seed classes are recognized as representing this variety. (No supporting data should be used in this application from Syn. generations other than those for the Breeder. Foundation and Certified Classes listed here).

D. **Procedures for maintaining seed stock:**

Breeder seed (syn 2) produced on 200 plants in cage isolation over a 2 year period was bulked. Seed classes will be breeder, foundation and certified. Foundation seed may be produced from breeder or foundation. The second generation foundation seed may be produced at the discretion of Pioneer Hi-Bred International, Inc. Both breeder and foundation seed will be maintained by Pioneer Hi-Bred International, Inc. Certified seed may be produced from breeder or foundation seed.

E. **Any other requirements or limitations necessary to maintain varietal characteristics?**

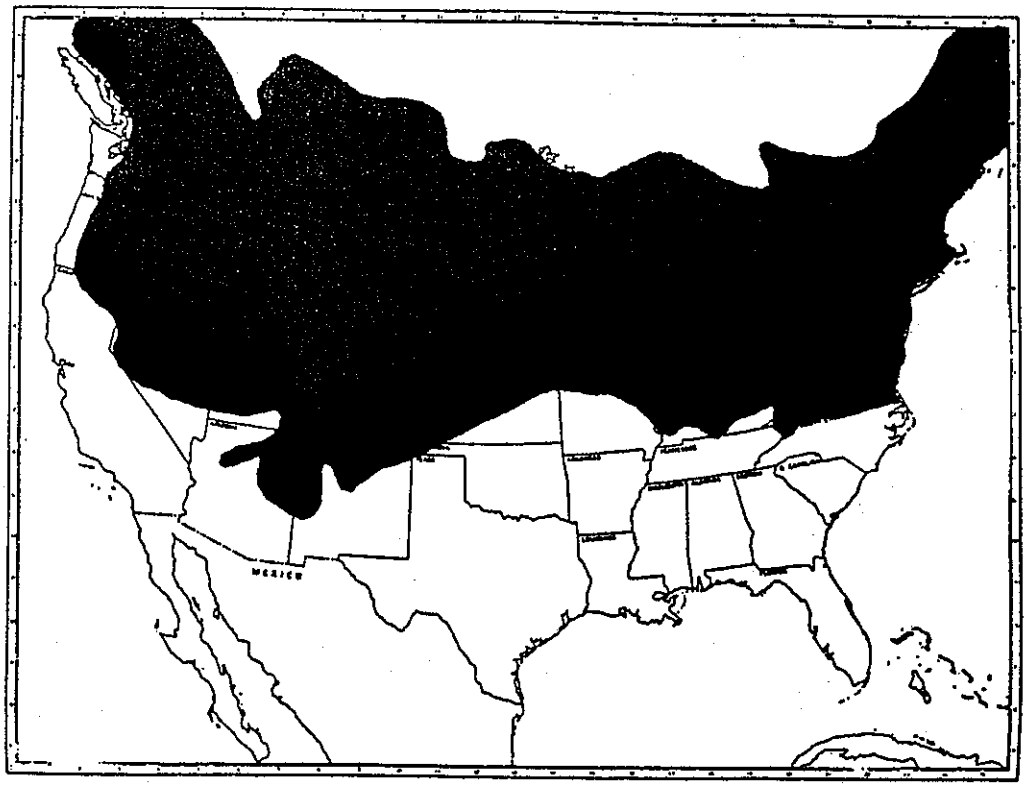
None

II. A. **Describe the primary use of this variety (if for uses other than hay, haylage, greenchop or dehydration):**

B. **List states and areas within states where tested for forage and/or persistence. (Present data from each location in IIIA and IIIB.)**

Johnston, IA; Toledo, IA; Owatonna, MN; Tipton, IN; Litchfield, MI; Marlette, MI; Phelps, NY; Lancaster, PA; Buckeystown, MD; Hermiston, OR; Connell, WA; Moses Lake, WA; Davis, IL; Arlington, WI; Markesan, WI

C. Indicate proposed areas of adaptation and intended use on the map below.



III. Evidence of agronomic performance, including data on yield (in T/A) and persistence. Data may be from tests conducted by private firms, Agricultural Experiment Stations or USDA.

A. Minimum required forage yield data is six location years with at least two locations (two locations must be at least 100 miles apart). Seeding year forage yield data cannot be used to satisfy this requirement. One location must have at least two harvest years beyond seeding year. Each harvest year should be listed separately.

Note: For non-dormant varieties (dormancy level of Moapa 69 or CUF-101) seeding year data may be accepted for up to two of the six location years when four or more cuttings are made in the seeding year.

Summarize Forage Yield Data below:

Test location	Date Plntd Mo/Yr	Syn Gen	Year Hvst	# Cuts	This Variety	Total Yield (DM T/A) 2.[a]	3.[b]	4.	LSD .05	CV%
Johnston IA	Spring 84	2	1985	4	7.40	-	6.59		.86	7.2
		2	1986	4	6.89	-	6.41		.77	6.9
	Spring 85	2	1986	4	7.24	6.62	7.18		.81	7.2
		2	1987	4	6.95	5.60	6.28		.71	6.5
Toledo IA	Spring 84	2	1985	4	7.82	-	7.07		.58	4.7
		2	1986	4	6.83	-	5.67		.53	5.3
	Spring 85	2	1986	4	7.12	5.85	6.45		.72	6.6
		2	1987	4	7.60	5.75	6.23		.56	5.0
Owatonna MN	Summer 84	2	1985	4	6.47	-	5.81		.96	8.9
		2	1986	4	7.18	-	6.23		.94	7.9
	Spring 85	2	1986	4	7.02	5.53	6.62		.59	5.4
		2	1987	3	6.66	5.41	5.47		.56	5.8
Tipton IN	Spring 84	2	1985	4	6.97	-	6.83		.53	4.7
		2	1986	3	4.22	-	3.77		.35	5.2
	Spring 85	2	1986	4	5.25	4.49	4.75		.58	6.9
		2	1987	4	5.62	4.71	4.76		.72	8.0
Litch-field, MI	Spring 84	2	1985	3	3.57	-	3.77		.53	9.4
		2	1986	4	8.13	-	7.60		.68	5.4
	Spring 85	2	1986	4	5.83	5.53	6.37		.69	7.1
		2	1987	4	3.09	2.58	3.37		.64	11.6
Marlette MI	Spring 84	2	1985	3	3.57	-	3.56		.76	12.4
		2	1986	4	7.41	-	6.46		.74	6.7
	Spring 85	2	1986	3	4.68	3.87	4.08		.54	7.7
		2	1987	3	3.25	2.64	2.41		.80	17.0
Phelps NY	Spring 84	2	1985	4	5.98	-	5.98		.43	4.5
		2	1986	4	8.21	-	7.90		.89	7.0
	Spring 85	2	1986	4	8.27	7.08	8.03		.72	5.5
		2	1987	4	7.19	5.48	5.68		.89	8.4
Lancas-ter, PA	Spring 84	2	1985	4	6.56	-	5.94		.59	5.8
		2	1986	4	6.10	-	4.90		.82	8.7
	Spring 85	2	1986	4	6.75	6.34	5.87		.82	7.4
		2	1987	4	5.15	4.14	4.09		.77	9.4

Test location	Date Plntd Mo/Yr	Syn Gen	Year Hvst	# Cuts	This Variety	Total Yield (DM T/A) 2.[a]	3.[b]	4.	LSD .05	CV%
Buckeys-	Spring 84	2	1985	4	6.56	-	6.93		.75	6.0
town, MD		2	1986	4	6.14	-	5.97		.74	7.7
	Spring 85	2	1986	4	5.62	4.86	4.81		.62	7.0
		2	1987	5	7.33	5.41	4.49		.97	9.1
Hermis-	Spring 84	2	1985	5	14.15	-	13.23		1.11	5.1
ton, OR		2	1986	5	12.50	-	11.38		1.07	5.2
	Spring 85	2	1986	5	12.80	11.92	12.42		1.11	5.5
		2	1987	3	5.52	5.06	5.98		.93	10.0
Connell	Spring 84	2	1985	5	12.10	-	11.98		.84	4.1
WA		2	1986	4	10.54	-	10.96		.91	5.2
	Spring 85	2	1986	5	13.83	11.35	13.18		.92	4.4
		2	1987	5	12.58	10.77	11.50		1.15	5.9
Moses	Spring 84	2	1985	4	11.61	-	10.85		1.10	6.2
Lake, WA		2	1986	3	8.91	-	7.59		.78	5.8
	Spring 85	2	1986	4	13.06	11.39	12.42		1.02	4.9
		2	1987	4	9.34	7.74	9.08		1.00	6.9
Davis	Spring 84	2	1985	3	6.36	-	5.88		.64	6.5
IL		2	1986	3	8.78	-	6.90		.74	6.0
	Spring 85	2	1986	3	7.90	6.85	7.30		.86	7.1
		2	1987	4	7.37	6.30	5.96		.75	7.0
Arling-	Spring 84	2	1985	4	6.36	-	6.56		.83	7.2
ton, WI		2	1986	4	7.85	-	5.91		.76	6.6
	Spring 85	2	1986	4	8.01	6.62	7.20		1.02	8.6
		2	1987	4	7.14	5.38	5.32		.83	8.4
Markesan	Spring 85	2	1986	4	7.45	6.57	6.86		.87	7.4
WI		2	1987	4	5.18	4.32	3.98		.79	10.2

Mean Annual Yield

	Years Hvstd	Total # of Hvsts			
Ck 2 comparison	30	119	7.36	6.21	X
Ck 3 comparison	58	228	7.52	X	6.92
Ck 4 comparison					

[a] Vernal
[b] Saranac

B. Persistence (winter and drought tolerance, summer survival relative to check varieties). Enter dates of both initial and Final stand estimates. Data must come from the area of adaptation and from stands at least two years old. More than one location must be given either when persistence is a trait used to justify release or when large diverse geographic areas of adaptation are recommended.

Test Location	Syn Gen	Date Seeded	Yrs. Hvtd	No. Hvts	Date of Readings Init/Final	% Stand This Variety In/Fnl	% Stand Check varieties [a] In/Fnl	% Stand Check varieties [b] In/Fnl	LSD .05	CV %
ZONE I	2	Spg 84	3	10/loc	Sum 84	100	-	99	1.58	1.7
					Fall 86	100	-	97	3.39	3.7
ZONE I	2	Spg 85	3	10/loc	Sum 85	100	98	99	1.32	1.4
					Fall 87	102	96	96	3.62	3.9
ZONE II	2	Spg 84	3	10/loc	Sum 84	100	-	97	2.47	2.7
					Fall 86	101	-	97	3.42	3.7
ZONE II	2	Spg 85	3	10/loc	Sum 85	98	101	101	3.37	3.6
					Fall 87	98	98	100	5.22	4.6
ZONE III	2	Spg 84	3	10/loc	Spg 85	102	-	97	2.45	2.7
					Fall 86	104	-	93	3.52	3.8
ZONE III	2	Spg 85	3	12/loc	Fall 85	100	100	100	1.05	1.1
					Fall 87	105	91	79	5.81	6.3
ZONE IV	2	Spg 84	3	14/loc	Sum 84	99	-	99	3.15	3.4
					Fall 86	99	-	101	2.92	3.2
ZONE IV	2	Spg 85	3	14/loc	Sum 85	99	101	101	3.11	3.4
					Fall 87	101	101	105	10.06	10.9
ZONE V	2	Spg 84	3	10/loc	Sum 84	100	-	101	2.13	1.9
					Fall 86	102	-	88	6.00	5.3
ZONE V	2	Spg 85	3	10/loc	Sum 85	102	98	102	4.92	5.3
					Fall 87	106	99	99	7.66	8.3

Scoring system used: Data taken as missing six inch units within each plot with a total plot size = 120 units. Data is in % of mean from a zone means AOV.

ZONE I (1984, 1985) = Johnston, IA; Owatonna, MN; Toledo, IA
ZONE II (1984, 1985) = Litchfield, MI; Marlette, MI; Tipton, IN
ZONE III (1984, 1985) = Lancaster, PA; Buckeystown, MD; Phelps, NY
ZONE IV (1984, 1985) = Hermiston, OR; Connell, WA; Moses Lake, WA
ZONE V (1984) = Davis, IL; Arlington, WI
ZONE V (1985) = Davis, IL; Arlington, WI; Markesan, WI

[a] Vernal
[b] Saranac

C. Fall dormancy relative to recognized varieties

1. Test data

Test Location	Syn Gen	Date Last Cut	Date Measures	Score or average height: This Variety	check varieties 1. [a]	2. [b]	3. [c]	LSD .05	CV %
*Owatonna MN	2	8/28/85	10/2/85	34.9	26.3	30.2	32.0	1.9	5.0
*Owatonna MN	2	9/2/86	10/1/86	31.8	24.0	27.4	28.9	1.6	5.0
**Exp. 1 Moses Lake WA	2	9/15/86	10/16/86	16.0	11.0	-	19.0	4.7	18.0
**Exp. 2 Moses Lake WA	2	9/15/86	10/16/86	23.0	13.0	-	22.0	4.8	14.0

Scoring system used: *Average height in CM of space plants; 25 plants each rep. with 6 replications.
**Average height of plot in CM; 3 replications

[a] Vernal
[b] Ranger
[c] Saranac

2. Indicate which of the following check varieties this variety most nearly compares to in fall dormancy.

VERY DORMANT	DORMANT	MOD. DORMANT	NON-DORMANT	VERY NON-DORMANT
Norseman ( )	Vernal ( ) Ranger ( )	Saranac (X) DuPuits ( ) Lahontan ( )	Mesilla ( ) Moapa 69 ( )	CUF 101 ( )

D. Seed production (this information optional)

Variety	Syn Gen	Test Location	Yrs. Tested	Average Yield (lbs/A)
This variety		No information		
1.				
2.				

IV. Other description characteristics

A. Flower color at full bloom. Syn generation observed 3 (see USDA Agr. Handbook No. 424 - A system for visually classifying alfalfa flower color).

98	% purple	T	% cream	T	% yellow
2	% variegated	T	% white		

B. Growth habit: (erect, semi-erect or decumbent)

Mid summer	Erect
Fall	Semi-erect

C. Optional: (Document distinctive characteristics such as pod, leaf or root traits, biochemical markers, etc.)

V. Pest Resistance Characteristics

Please follow these instructions carefully when reporting pest resistance results.

Furnish comparative data on the following insects and diseases (and others where applicable) for your variety. Data may be from tests conducted by private firms, Agricultural Experiment Stations, or USDA. Tests should be conducted by standard procedures as described in ARS Misc. publication 1434. Each disease and insect test must include recognized resistant and susceptible checks. Resistance levels should be characterized using % resistant plants as follows: S=<6%, LR=6-14%, MR=15-30%, R=31-50%, HR=>50%. Do not refer to tolerance. Chec s should be characterized based on long term % resistance averages published in ARS Misc. publication 1434. If data for the resistant check does not fit its expected resistance class (MR, R, HR, etc.)

data must be adjusted to the long term mean. If data has been adjusted, supply both adjusted and unadjusted values and indicate how and by whom the adjustment was made. If a scoring or rating system is used, specify the limits and meaning of scores. Pest resistance data must be submitted on at least four of the following nine pests: anthracnose, bacterial wilt, Fusarium wilt, Verticillium wilt, Phytophthora root rot, stem nematode, pea aphid, spotted alfalfa aphid, and blue alfalfa aphid. For the pests where no data is available write "Not tested". The four required pests must be selected from those that frequently cause significant losses on susceptible cultivars in the area of proposed adaptation of this variety. (Use the map you have shaded in IIC and compare with the maps of distribution and severity of alfalfa pests in ARS Misc. publication 1434. This will determine for which pests you must submit resistance information.) Show generation of seed used for each test.

ANTHRACNOSE (Race 1)

Test conducted Pioneer Hi-Bred International, Inc. at Johnston, IA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1983	2	13.8	18.6	
1. Arc	HR			63.3	85.4	
2. Sar AR	HR			48.2	65.0	
3. 526	S			0.5	0.7	
L.S.D.	(.05)			4.4		
	(.01)					
C.V.	(%)			30.1		

Scoring system used: % surviving seedlings; ~100 plants/rep; 3 reps Data adjusted to Sar AR at 65% resistant plants by Pioneer Hi-Bred International, Inc.

ANTHRACNOSE (Race 1)

Test conducted University of Wisconsin at Madison, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1984	2	12.3	17.2	
1. Sar AR	HR			46.5	65.0	
2. Arc	HR			55.2	77.2	
3. Saranac	S			3.9	5.4	
L.S.D.	(.05)			12.7		
	(.01)					
C.V.	(%)			40.4		

Scoring system used: % survival of 14 day-old seedlings; 50 plants/rep; 4 reps. Data adjusted to Sar AR at 65% resistant plants by Pioneer Hi-Bred International, Inc.

ANTHRACNOSE (Race 1)

Test conducted USDA-ARS at Beltsville, MD

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	67.2		
1. Arc	HR			84.9		
2. Saranac	S			14.5		
3.						
L.S.D.	(.05)			13.1		
	(.01)					
C.V.	(%)			16.0		

Scoring system used: % survival of young seedlings; 4 replications

BACTERIAL WILT

Test conducted by Pioneer Hi-Bred International, Inc. at Arlington, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	R	1985	2	42.7		5.59
1. Vernal	R			60.1		6.07
2. Narragansett	S			0.0		2.63
3.						
L.S.D.	(.05)			14.9		0.76
	(.01)					
C.V.	(%)			19.0		7.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease and 1=dead plant) considered resistant.

BACTERIAL WILT

Test conducted by Pioneer Hi-Bred International, Inc. at Arlington, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	R	1987	2	33.74	61.80	5.0
1. Vernal	R			22.93	42.00	4.5
2. Narragansett	S			1.27	2.33	2.8
3.						
L.S.D. (.05)				20.53		0.63
(.01)						
C.V. (%)				23.0		8.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease and 1=dead plant) considered resistant. Data adjusted to Vernal at 42% resistant plants by Pioneer Hi-Bred International, Inc.

BACTERIAL WILT

Test conducted by University of Minnesota at Rosemount, MN

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	R	1987	2	37.71	39.24	2.30
1. Vernal	R			40.37	42.00	2.22
2. Ranger	MR			22.37	23.28	2.55
3. Narragansett	S			5.59	5.82	3.45
L.S.D. (.05)						0.50
(.01)						
C.V. (%)						14.34

Scoring system used: Plants scored 0 and 1 (on a 0-5 scale, where 0=no disease, and 5=dead plant) considered resistant. Data adjusted to Vernal at 42% resistant plants by University of Minnesota.

FUSARIUM WILT

Test conducted by University of Minnesota at Rosemount, MN

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	R	1988	2	51.4		2.36
1. Agate	R			54.1		2.29
2. MNGN-1	S			9.6		4.48
3. Narragansett	MR			47.6		2.81
L.S.D.	(.05)					0.65
	(.01)					
C.V.	(%)					18.8

Scoring system used: Plants scored 0 and 1 (on a 0-5 scale, where 0=no disease, and 5=dead plant) considered resistant.

VERTICILLIUM WILT

Test conducted by Pioneer Hi-Bred International, Inc. at Connell, WA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1985	3	16.0		3.4
1. Vertus	R			33.0		4.8
2. Saranac	S			8.0		2.4
3. Vernema	R			15.0		3.4
L.S.D.	(.05)			9.7		
	(.01)					
C.V.	(%)			32.0		12.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=0 disease, and 1=dead plant) considered resistant.

VERTICILLIUM WILT

Test conducted by University of Wisconsin at Madison, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	3	28.2	22.1	3.29
1. Vertus	R			52.4	41.0	2.60
2. Sar AR				11.0	8.6	3.88
3.						
L.S.D.	(.05)			12.0	9.38	.42
	(.01)					
C.V.	(%)			21.4	21.4	10.7

Scoring system used: Plants scored 1 and 2 (on a 1-5 scale, where 1=no disease, and 5=dead plant) considered resistant. Data adjusted to Vertus at 41% resistant plants by Pioneer Hi-Bred International, Inc.

VERTICILLIUM WILT

Test conducted by Pioneer Hi-Bred International, Inc. at Arlington, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	3	20.60		4.01
1. 5444	HR			44.21		5.40
2. Saranac	S			7.73		2.92
3.						
L.S.D.	(.05)			10.6		0.84
	(.01)					
C.V.	(%)			36.0		14.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease, and 1=dead plant) considered resistant.

PHYTOPHTHORA ROOT ROT

Test conducted by University of Minnesota at St. Paul, MN

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	35.53	27.03	3.35
1. Agate	R			56.52	43.00	2.90
2. Saranac	S			21.93	16.69	4.42
3.						
L.S.D.	(.05)					0.75
	(.01)					
C.V.	(%)					17.60

Scoring system used: Plants scored 1 and 2 (on a 1-6 scale, where 1=no disease, and 6=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by University of Minnesota.

PHYTOPHTHORA ROOT ROT

Test conducted by University of Minnesota at St. Paul, MN

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	32.84	24.99	3.72
1. Agate	R			56.52	43.00	2.90
2. Saranac	S			21.93	16.69	4.42
3.						
L.S.D.	(.05)					0.75
	(.01)					
C.V.	(%)					17.60

Scoring system used: Plants scored 1 and 2 (on a 1-6 scale, where 1=no disease, and 6=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by University of Minnesota.

PHYTOPHTHORA ROOT ROT

Test conducted by University of Minnesota at St. Paul, MN

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	29.02	22.08	3.72
1. Agate	R			56.52	43.00	2.90
2. Saranac	S			21.93	16.69	4.42
3.						
L.S.D.	(.05)					0.75
	(.01)					
C.V.	(%)					17.60

Scoring system used: Plants scored 1 and 2 (on a 1-6 scale, where 1=no disease, and 6=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by University of Minnesota.

PHYTOPHTHORA ROOT ROT

Test conducted by Pioneer Hi-Bred International, Inc. at Arlington, WI

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	10.36	16.93	2.3
1. Agate	R			26.32	43.00	3.8
2. Saranac	S			2.38	3.89	1.4
3.						
L.S.D.	(.05)			12.3	20.1	1.14
	(.01)					
C.V.	(%)			59.5	59.5	27.7

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease, and 1=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by Pioneer Hi-Bred International, Inc.

PHYTOPHTHORA ROOT ROT

Test conducted by Pioneer Hi-Bred International, Inc. at Johnston, IA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1987	2	26.3	36.5	5.2
1. Agate	R			30.9	43.0	5.5
2. Saranac	S			3.8	5.3	3.6
3.						
L.S.D.	(.05)			14.4	20.0	0.77
	(.01)					
C.V.	(%)			35.0	35.0	10.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease, and 1=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by Pioneer Hi-Bred International, Inc.

PHYTOPHTHORA ROOT ROT

Test conducted by Pioneer Hi-Bred International, Inc. at Johnston, IA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	MR	1984	2	13.9	21.7	3.9
1. Agate	R			27.6	43.0	4.7
2. Saranac	S			4.9	7.6	2.5
3.						
L.S.D.	(.05)			13.9	21.6	0.82
	(.01)					
C.V.	(%)			57.0	57.0	13.1

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no disease, and 1=dead plant) considered resistant. Data adjusted to Agate at 43% resistant plants by Pioneer Hi-Bred International, Inc.

STEM NEMATODE

Test conducted by Pioneer Hi-Bred International, Inc. at Fresno, CA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	R	1988	3	32.6		2.84
1. Lahontan	R			38.1		3.10
2. Ranger	S			4.3		1.37
3. Vernal	S			6.3		1.33
L.S.D.	(.05)			10.8		0.58
	(.01)					
C.V..	(%)			34.0		17.0

Scoring system used: Plants scored 7-9 (on a 1-9 scale, where 9=no symptoms, and 1=dead plant) considered resistant.

PEA APHID

Test conducted by Pioneer Hi-Bred International, Inc. at Johnston, IA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	HR	1987	2	50.9	78.0	4.3
1. Baker	R			45.7	70.0	3.9
2. Kanza	R			15.7	24.0	2.9
3. Ranger	S			5.6	8.6	2.3
4. Vernal	S			0.0	0.0	1.3
L.S.D.	(.05)			11.7	17.9	0.48
	(.01)					
C.V..	(%)			24.0	24.0	8.0

Scoring system used: Plants scored 5-9 (on a 1-9 scale, where 9=no symptoms, and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by Pioneer Hi-Bred International, Inc.

8900133

SPOTTED ALFALFA APHID

Test conducted by Pioneer Hi-Bred International, Inc. at Fresno, CA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	HR	1987	2	25.2	104.9	2.5
1. Baker	R			16.8	70.0	2.2
2. Ranger	S			0.8	3.2	1.1
3.						
L.S.D.	(.05)			9.6	40.1	0.48
	(.01)					
C.V..	(%)			23.0	23.0	11.0

Scoring system used: Plants scored 5-9 (on a 1-9 scale, where 9=no symptoms, and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by Pioneer Hi-Bred International, Inc.

SPOTTED ALFALFA APHID

Test conducted by Pioneer Hi-Bred International, Inc. at Fresno, CA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	HR	1987	2	30.0	97.5	3.3
1. Baker	R			21.5	70.0	2.5
2. Ranger	S			3.9	12.6	1.2
3.						
L.S.D.	(.05)			9.4	30.5	0.53
	(.01)					
C.V..	(%)			22.0	22.0	12.0

Scoring system used: Plants scored 5-9 (on a 1-9 scale, where 9=no symptoms, and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by Pioneer Hi-Bred International, Inc.

8900133

SPOTTED ALFALFA APHID

Test conducted by Pioneer Hi-Bred International, Inc. at Fresno, CA

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety	HR	1987	2	27.8	73.0	2.91
1. Baker	R			26.6	70.0	2.66
2. Saranac				5.0	13.1	1.37
3.						
L.S.D.	(.05)			11.2	25.5	0.62
	(.01)					
C.V..	(%)			24.0	24.0	12.0

Scoring system used: Plants scored 5-9 (on a 1-9 scale, where 9=no symptoms, and 1=dead or severe stunting) considered resistant. Data adjusted to Baker at 70% resistant plants by Pioneer Hi-Bred International, Inc.

BLUE ALFALFA APHID

Test conducted by _____ at _____

Variety	Resistance class	Year Tested	Syn. Gen.	Unadjust. % R	Adjust. % R	Score or A.S.I.
This variety		No information				
1.						
2.						
3.						
L.S.D.	(.05)					
	(.01)					
C.V.	(%)					

Scoring system used: _____

VI. Summarize here the main advantages and characteristics of the variety. (Other than forage and seed yields.)

5364 is a moderately dormant variety which has high resistance to pea aphid and spotted alfalfa aphid; resistance to bacterial wilt, Fusarium wilt, and stem nematode; and moderate resistance to anthracnose, Verticillium wilt, and Phytophthora root rot.

VII. If this variety is accepted by official certifying agencies, when will certified seed first be offered for sale? _____

Spring, 1989

VIII. Plant Variety Protection

A. Will application be made for PVP?

Yes ___X___ No _____ Undecided _____

B. If yes, will the application specify that the variety is to be sold by variety name only as a class of certified seed?

Yes _____ No ___X___

IX. As a means of added varietal protection, are you willing to have the information herein turned over to the PVP office?

Yes ___X___ No _____

William T.W. Woodward
Signature of Applicant

At the time a variety is accepted for certification, a seed sample of the generation or generations requested by the certifying agency shall be submitted to the certifying agency by the sponsor. This lot(s) is to be retained as a control sample against which all future seed stocks released for certified seed production may be compared to establish continued trueness of variety.

EXHIBIT E

STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

'5364'

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of 5364. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of 5364.